



Office of Energy Efficiency
and Renewable Energy

\$10/kW Bipolar Separator Plate for Fuel Cells

Background

The bipolar separator plate is one of the most expensive components in the polymer electrolyte membrane fuel cell (PEMFC). The cost of a fuel-cell stack system must be reduced from \$800 per kilowatt to \$35 per kilowatt (kW) to become a commercial success in automobile use.

The U.S. Department of Energy (DOE) is sponsoring a program with the Institute of Gas Technology (IGT) to develop a molded composite graphite bipolar plate that is inexpensive and performs as well as machined graphite bipolar plates.

IGT has developed a \$10/kW material and fabrication process to mold channels into the plate. No post-molding finishing or machining steps are needed, and essentially any plate design configuration is possible. With the flexibility of the composite molded parts, much thinner plates are possible than with machined graphite.

Accomplishments

- ◆ IGT, Stimsonite, and Superior Graphite have developed molded composite bipolar separator plates that
 - Exceed all DOE requirements for conductivity, chemical, and physical stability.
 - Performance and endurance equivalent to traditional machined graphite.
 - Have been scaled up from 60-cm² to 300-cm² active area.
- ◆ Stimsonite and ENDESCO Services have formed a new company, PEM Plates, to mold PEMFC bipolar plates for developers worldwide. PEM Plates is supplying plates to AlliedSignal for testing and is seeking customers to begin the first phase of its pilot molding operation.

Benefits

- ◆ Low-cost \$10/kW separator plates could bring fuel cells for vehicles to market sooner.



Bipolar Separator Plate Active Area

- ◆ Molded plate process and materials are amenable to high-volume manufacturing.
- ◆ Properties of the molded composite plates allow more compact, lighter fuel-cell stacks.
- ◆ Flexibility of the molded composite plates results in a more durable and rugged stack.
- ◆ Use of molded composite plates in other applications will create demand and increase production rates, resulting in further cost reductions.

Future Activities

- ◆ Validate molding process at the pilot manufacturing level.
- ◆ Conduct molding trials with developer designs.
- ◆ Conduct additional stack endurance and verification testing.
- ◆ Obtain orders from developers to reach production levels needed for further cost reductions.

